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Crib Notes

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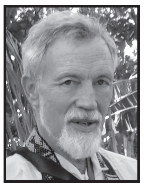

E. N. Anderson

Traditional ecological knowledge (TEK) has often been regarded as outdated, frozen in the past. For example, the anthropologist Paul Nadasdy (2004) found such attitudes in the Yukon, where government biologists, often with little field experience, dismissed and belittled local indigenous knowledge. They assumed it to be static and anecdotal, and often based on spiritual rather than empirical foundations. Similar dismissal of TEK by biologists and others is widely reported. Even anthropologists often regard TEK as a quaint survival technique that can be ignored in studies of indigenous peoples today.

Yucatec Maya folk botany, however, is not only empirical; it is rapidly changing and evolving to take account of new species and their properties. The Yucatec Maya of the Yucatan Peninsula have an extensive knowledge of plants (Anderson 2003, 2005). Like Yucatec ornithology (Anderson 2000), it is scientific, in the sense that it is a fundamentally empirical system, derived from experience but organized in accord with theories about the world, and open to change as new knowledge becomes available.

The knowledge base is notably rich. The most recent compilation of Yucatec Maya plant names (Arellano Rodriguez et al. 2003) lists almost 900 species known and used, with Maya names for most of them. I found several further names in Quintana Roo (Anderson 2003). The closely related Itzaj Maya have essentially the same ethnobotanical system, and their range lies south of Yucatec territory, giving them knowledge of more tropical species (Atran and Medin 2008; Atran et al. 2004; Hofling and Tesucún 1997). Combining the Yucatec compilations with the Itzaj data, the total reaches over 1,000 folk taxa, with enormous knowledge of the uses, phenology, growing habits, and ecology of most of them, as well as cultivation techniques for the several hundred species in cultivation.

In one small area alone—Chunhuhub and neighboring villages in Quintana Roo—I have recorded about 1,310 names applying to about 700 species. (Many of the extra names are synonyms; some are varietal names.) This goes well beyond the usual ethnoscientific systems of small-scale societies, which Eugene Hunn has shown to be generally limited to about 500 terms per domain (Berlin 1992; Hunn 2008). Other Maya cultural groups also have enormous ethnobotanical knowledge bases (e.g., Tzeltal: Berlin et al. 1974; Tzotzil: Breedlove and Laughlin 1993; Chorti: Kufer 2005).

The Yucatec system apparently evolved from that of classic Maya civilization (see Sharer and Traxler

2005). Classic depictions of maize, ceiba trees, cacao, and other plants show continuity in beliefs. The early colonial dictionaries show the same plant taxonomy as today's. Classic hieroglyphics can sometimes be read; **kakaw,** for instance, meant 'chocolate' then as now (McNeil 2006).

One bit of evidence for the scientific nature of Mesoamerican traditional knowledge is its direct influence on European science, especially in the Age of Discovery. Though contemporary science has grown from a largely European and Near Eastern stock, it has been enormously enriched by the scientific traditions of China, India, Africa, and the New World; the Maya contributed their share. In botany, this was limited to cacao and a number of other useful plants. Other New World ethnobotanical traditions influenced the development of modern scientific botany, when European botany in the 16th century confronted other traditions (Ogilvie 2006). Nicolas Monardes' Spanish work on New World ethnobotany was the first published European book dealing solely with non-European plant knowledge. It was immediately translated into English as *Joyfull Newes out of the New-Founde Worlde* (Monardes 1925/1577).

Then and now, the Maya system changes and expands as new plants arrive. It adopted and adapted plants introduced by the Spanish, often creating new names for them. Although the orange was at first referred to by the Spanish name **naranja** (as in the Motul dictionary; Arzápalo Marín 1996) it soon was Mayanized to **pak'al** ('planted thing'). Within my own research period, Yucatec Maya in western Quintana Roo have tried unsuccessfully to grow apples and grapes, have named newly arrived weeds like sow thistle (*Sonchus oleraceus,* spontaneously referred to as **repollo k'aax** ['forest cabbage']), and have successfully adopted new cultivated plants, notably South American passion fruit (under its Brazilian name of **maracuyá**) and Hawaiian **noni** (*Morinda citrifolia*), a medicinal plant. Maya TEK adds new learning just as other scientific systems do.

Yucatec Maya ethnobotany also shows its scientific nature in its similarities to field botany everywhere. Rural people worldwide have to know a great deal of accurate, reliable, and pragmatic information about local plants, and European scientific botany grew from this (Morton 1981; Ogilvie 2006). Learning this, and coding it in the most convenient and useful ways, constrains the amount of intercultural variation in botanical systems. The Maya have an incredible amount of accurate working knowledge of the value of plants for firewood, medicine, nutrition, crafts, and ornamental gardening.

Maya plant taxonomy is similar to international scientific botany (Anderson 2003). Maya folk genera, species and varieties correspond closely to Linnaean genera. Every sizable and even somewhat distinctive plant species has its own name, mapping well onto Linnaean species. Trees, in particular, map out almost exactly 1:1 on current Linnaean species categories. Like many taxonomies worldwide (including Linnaeus' own), Maya taxonomy lumps together similar but small and not-very-significant plants under one category. Among important plants, the correspondence is usually Maya generic to Linnaean species. With less important plants, Maya folk-generic terms correspond very well to Linnaean genera. With very unimportant species-groups, however, Maya generics may correspond to entire Linnaean families or even orders. The extreme is lumping all orchids (except the useful vanilla) under one name (**ch'it ku'uk** ['squirrel's broom']).

The Maya unique beginner—the equivalent of 'plant' in English—is a bound form: **k'ul***,* the counter for plants, appended to numbers and demonstratives. Like other languages, Yucatec has life-form categories: "tree," "vine," "herb," "grass," and other common terms (including minor ones like bamboo and agave; cf. Brown 1984). In Yucatec, as in English, major plant life-form categories clearly *crosscut* the basic taxonomic system, rather than being subdivisions within it. Some species can be either trees or bushes depending on habitat. In fact, the same plant can be a tree in some contexts, an herb in others, since Maya **che'** ('tree') can include very small plants as long as they have a single rather woody stem.

Other plants can be either vines or herbs. (Animals are different: terms like **ch'ich'** ['bird'] and **kaan** ['snake'] *are* part of the taxonomy [Anderson and Medina Tzuc 2005].)

Spanish terms for intermediate groupings have frequently been borrowed; apparently there is a felt need for such groupings. Maya have also adopted **cítricos** for citrus fruit, **frijoles** for beans, **calabasas** for squash (there seems no indigenous word for this well-recognized category, of which six native species are grown), **helechos** for ferns, and **palmas** for palms.

This sort of expansion, revision, and extension of terms happened also in European scientific history. Development of middle taxonomic levels—orders, families—seems largely a post-Renaissance development within European science. Early taxonomies in Europe (Blunt 1984; Morton 1981; Ogilvie 2006), China (Anderson 1991), and elsewhere are all shallow, like Native American ones. In the Renaissance, European botanical knowledge exploded, due to exploration in Asia and the New World and botanizing in Europe itself. The resulting need to classify countless new plants led to expanding categories at all levels. Many terms that formerly meant one species suddenly became generic terms for whole species-groups. "Pine," "ash," and "oak" are familiar English examples, as are **roble** ('deciduous oak') and **encino** ('evergreen oak') in Spanish.

This correspondence between world sciences is driven by the need to recognize botanical reality. Species are real; they have specific chemical and other identities that make them edible, medicinal, poisonous, or otherwise important to recognize. Life-form plant categories like "tree" and "vine" matter in a different way: they recognize the broad use-categories that humans create. They do not map onto Linnaean relationships. Instead, they classify plants by use: trees for wood (and the like), herbs for food and browse, grass for fuel and grazing, etc. Thus taxonomy (*sensu stricto*) is based on real biological relationships, while life-forms are based on human use-values rather than biology.

As pointed out by Atran (1990), Berlin (1992), and others, taxonomies overshoot mere necessity and classify many things simply because they are there. Humans have a general, probably innate, tendency to name everything salient in their environment. Hunn (1982, 2008) suggests that this is because a useful classification system has to be productive—it has to be capable of extension. It thus tends to be used on all salient items, whether these have any obvious and immediate value or not.

However, TEK is also influenced by factors other than pragmatic ones. So is western science, and indeed all systems of thought. Political power, for instance, is often represented or mirrored in scientific systems. Michel Foucault (1970) made a convincing case for extending this thinking to some aspects of the Linnaean system, noting obvious European social origins for the terms "kingdom," "order," and "family."

Foucault (1970) and other scholars of science (e.g., Bowker and Star 1999) see classifying nature as intrinsically uncertain and ambiguous, such that humans can classify only by imposing human social systems—including those that are unfair, oppressive, and exploitive—on the nonhuman world.

Yet the cross-cultural record shows that folk and traditional classification systems worldwide are largely about pragmatic use, especially in everyday contexts of making a living. Power may inject itself more than trivially, but is not the major factor. Maya ethnobiological systems have no political terms equivalent to "kingdom" or "order," and neither do most systems of TEK. This supports the classic Marxian position on working knowledge (Engels 1966); it is fundamentally derived from interacting with the world through labor, but is then influenced by considerations of social power. Indeed, judging from the comparative literature on folk classification (Atran 1990; Atran and Medin 2008; Berlin 1992), Marxian and utilitarian theories, and even the Platonist or phenomenological theories that underlie much work on classification and the human tendency to classify, seem superior to Foucauldian theory in overall explanatory power. TEK is not a mere reflection of society.

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Another influence on TEK is spiritual and religious belief. The ancient Maya plant classification system was considerably affected by supernatural and ritual power considerations (e.g., Sharer and Traxler 2005), and elements of these beliefs survive today. The ceiba was the world tree, and is still considered supernaturally powerful or spirit-haunted. The cacao, originally introduced from South America, was apparently special for the nobility as well as being sacred. Tobacco was and is a ritual plant identified with certain gods and used in rituals and curing; more long-established in the area, it was probably sacred long before civilization reached the Maya. Some flowers, such as the water lily, were reserved for royal or ceremonial use; flowers are still highly regarded and heavily used in religious ceremonies. The **jabiin** tree (*Piscidia piscipula*) was presumably sacred then, and it is today. Its beautiful flowers and lush foliage, occurring at the time the rains are set to begin, are associated with rains and fertility, and used on altars and offering tables. Thus considerations of power—spiritual more than political—do influence Maya folk botany. However, the influence is minor and, today, rather peripheral.

The truly revered plant, in ancient times and today, is maize, still the sacred food. It is the great leveller; virtually everyone grows their own, and no one has or grows a huge amount. It is a symbol of Mayaness, humanness, and equality—the antithesis of a symbol of unequal power. The old idea that humans were molded from maize dough is not entirely dead. The pragmatic egalitarianism in the maize field is not "resistance" to power, but simple assertion that basic common humanity is what matters, and we are all equal in the maize plant.

Most traditional cultures lack separate, named disciplines called "science" or "religion" because they have their own distinctive ways of cutting up the knowledge domain. Because of this, it can make sense to speak of science in traditional systems that seem to the outsider to be based on "religion" as well as empirical and pragmatic knowledge (González 2001). The Yucatec Maya speak of "knowledge" and "knowing" as one thing; the verbal roots are **ojel** ('know') and **kajool** ('know by heart'). Science is an imported category. **Ook ool** ('religion,' literally 'beliefs of the heart') refers to Christianity and does not usually include beliefs in indigenous supramundane forces. The Maya believe in elves (**aluuxo'ob**), forest spirits (**yumilk'aax**), and other shadowy beings just as they believe in deer and oranges.

This need not make Maya biology unscientific. A science without debatable statements—a science where everything is known for certain—is a dead science. Science advances by finding more and more verifiable knowledge, and postulating explanations for these. Such explanations are, necessarily, social constructions, being hypotheses or theories for testing rather than proven facts. They are often conditioned by existing beliefs (including spiritual ones), for lack of better grounding. Science is told from dogma by whether the data and inferred explanatory variables change with time and new findings. Yucatec Maya science does so (like that of the Zapotec [Gonzalez 2001; Hunn 2008] and so do many other groups [Berkes 2008; Turner 2005]).

Yucatec beliefs about magic (**secretos**), like equivalent Euro-American beliefs, may lack real-world referent (compare Latour 2004, 2005), but this does not render the huge system of empirical knowledge unscientific. Moreover, in Yucatec discourse, secretos are kept strictly separate from ordinary empirical knowledge of plants and animals. Secretos may involve magical plant lore, but the secretos are discussed differently and transmitted through different channels from ordinary everyday working knowledge.

The western world again offers parallels. Separation of science and religion arose around 1850, about the time Thomas Henry Huxley invented the word and concept of "agnosticism." Scientists writing history, such as Martin Rudwick (2005, 2008), have pointed out that scientists before Darwin, and many since, were as devout as anyone else. Many, including Isaac Newton, Robert Boyle, and Linnaeus, saw science as

a religious cause: the search for God's laws and for understanding God's will (Blunt 1984). Thus, at least until recent times, western science fused with religion and incorporated religious ideas, just as traditional systems did.

Studies of folk taxonomy around the world have shown that people everywhere recognize similar categories, which have a complex but reasonably good relationship to the ones found by international biological science (Atran 1990; Berlin 1992; Hunn 2008). There is a large social component, but this facilitates rather than hinders a considerable meeting of minds across cultures. Science is socially constructed, but that does not mean that it is wrong; cultures must construct reasonable plans or die out. Many social constructionists believe it is impossible to know anything about the nonhuman realm, though they allege or imply that humans have exquisite knowledge of their social and cultural worlds. In fact, social construction can make knowledge more comprehensive, accurate, and useful (Latour 2004, 2005).

In fact, ethnoscience is adaptable, open, and reasonably accurate, and a major source of knowledge that is useful worldwide. It parallels European scientific classification in recognizing species and in grouping them taxonomically, in basic pragmatic elements, and even in the less rational or pragmatic aspects of system-building.

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